

REMARKS

Favorable reconsideration of the application is requested in view of the following remarks.

Claims 25-27 are newly added. Thus, Claims 14-27 are currently pending in this application with Claims 14, 20 and 21 being independent.

Claims 14, 20 and 21 are amended to correct minor formal matters, those amendments not affecting the scope of the claims.

The Official Action rejects Claims 14, 15 and 19-24 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,390,003, hereinafter *Yamaguchi*, in view of U.S. Patent No. 5,048,109, hereinafter *Bloomberg*. Claims 16-18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Yamaguchi* in view of *Bloomberg* and further in view of the Background of the present application.

Background of Application

Before turning to the claim language, it will be beneficial to the understanding of the presently claimed subject matter to refer to some of the description in the present application. As noted in the Background section of the present application, the application relates to an apparatus and method for detecting a specific pattern contained in an image. Beginning on page 4, a pattern-detection process is described with reference to the flowchart in Fig. 4. First, the image data is binarized. Next, the binarized image data is converted to a lower resolution. Next, a filter of a certain size (M x N) frames any elements that fit therein, those being pattern-determination results. Elements are framed when the outside rows of pixels of the

frame are all "off". Once the elements are framed, the pattern-determination results are evaluated.

Beginning on the bottom of page 18 of the present application, an element-recognition process is described with regard to Fig. 5. An element-candidate determiner 31 evaluates the found elements based on predetermined conditions. That is, the element-candidate determiner 31 evaluates objects in input pixel-block areas (as identified by the filter $M \times N$) and finds which candidates satisfy the predetermined conditions. Page 20, lines 15-21 describes that two examples of predetermined conditions are: 1) that the pixels constituting the outermost lines of the pixel block area are all OFF pixels, and that 2) the number of ON pixels in a predetermined area around a target pixel in the pixel-block area is within a prescribed range (e.g., 6-10). An example of these predetermined conditions is shown in Fig. 7 of the present application. There it is shown that the pixels constituting the outside rows of a 7×7 pixel-block area are all "OFF. Also, the number of ON pixels in the 5×5 pixel area is 6-10. Based on that evaluation, and ones similar, various recognition objects are selected as being element candidates. Also, various objects that do not meet the criteria, e.g., more than 10 ON pixels, are identified as not being element candidates.

The objects that are selected as element candidates are input into the element-candidate-size detector 32 and a final element determiner 34.

Art Rejections

Claims 14, 15 and 19-24 are rejected as being unpatentable over *Yamaguchi* in view of *Bloomberg*.

Claim 14 is directed to a pattern-detection apparatus that detects a specified pattern contained in an image. The pattern-detection apparatus has a binarizing unit that binarizes input image data to obtain binary image data. A partial-image recognition unit recognizes a partial image being contained in the binary image data and being part of the specific pattern. A specific pattern determination unit determines the specific pattern contained in the image, based on the recognition results obtained by the partial-image recognition unit. The partial recognition unit recognizes a partial image contained in the binary image data, for a pixel-block area having a predetermined size and containing a target pixel in the binary image data, based on at least one of: conditions concerning pixels at the opposite vertices, conditions of pixels on outermost lines of the pixel-block area, and conditions of pixels on opposite sides on the outermost lines of the pixel-block area.

Yamaguchi discloses a copying system for preventing copying copy-prohibited images. Basically, *Yamaguchi* is concerned with persons making copies of bills, checks, or notes (currency). To prevent such copying, *Yamaguchi* discloses a device that detects marks on currency, and upon detection of such a mark, prints "invalid" on the copy where the mark would otherwise be reproduced. As described in columns 11 and 12 and shown in Fig. 10 of *Yamaguchi*, "[t]he image data sent to the bill recognition processing section 67 is compared with the reference image data in a pattern-matching portion (preliminary decision)" (column 11, lines 57-59). That is, the peripheral circular outline of the pattern is first detected (column 11, lines 53-54). "If it is decided at step S1009 that the former is not coincident with the latter, it is decided that the original is not a bill" (column 11, lines 63-65). "However, if it is decided at step S1009 that the former is coincident with the latter, there is a

possibility that the original document is a bill. Therefore, the main decision is made (column 12, lines 3-6) and entails sequential comparison of the image data stored in the bit map memory with each of the reference image data as shown in Fig. 10. That is, there are a number of images (the same pattern at different angles of rotation) that are compared with the scanned image. *Yamaguchi* does not provide any description beyond generally stating that the image data is compared with the saved images.

Bloomberg discloses a method and apparatus for detecting highlighted regions of a document. That is, a person highlights a document with a brightly colored marker, and those highlighted regions are detected and the text is extracted from therein. As described in the Background of *Bloomberg*, one of the problems with known detection and extraction processes relates to the imperfect application of highlighter onto a document, i.e., incomplete coverage or over-coverage. The devices have difficulty detecting intended characters which are not fully highlighted and tend to detect some unintended characters that are partially highlighted. To address the issue of partially highlighted characters, *Bloomberg* discloses a device including sub-processes such as "Erosion", "Dilation", "Opening" and "Closing" to clean up and better detect the highlighted area. Other filter-type processes are used to clean up the detected image of the highlighted text, as well as the highlighted area. Basically, it seems that *Bloomberg* discloses cleaning up the highlighted region to better define the highlighted marks, and then extracting and cleaning up the highlighted text.

As recognized in the Official Action, *Yamaguchi* does not disclose at least a partial-image recognition unit that recognizes a partial mage contained in the binary

image data, for a pixel-block area having a predetermined size and containing a target pixel in the binary image data, based on at least one of the conditions concerning the pixels at the opposite vertices, the pixels on the outermost lines of the pixel-block area, and the pixels on the opposite sides on the outermost lines of the pixel-block area. For a disclosure of that subject matter *Bloomberg* is relied upon, and it is asserted that it would have been obvious to modify *Yamaguchi* to include all of that subject matter.

However, *Bloomberg* does not disclose that for which it is relied upon in the Official Action. For example, *Bloomberg* is relied upon for a disclosure of subject matter relating to recognition of a partial image of a specific pattern contained in binary image data. For a disclosure of that subject matter the Official Action relies on the disclosed detection of highlighted regions. That is, page three of the Official Action states that “Bloomberg states that ‘the present invention provides a method and apparatus for identifying highlighted marks and regions (partial images) in a document.’” The Official Action also directs attention to a portion of *Bloomberg* that states “in other applications, a user may circle a portion of a document using a color pen, and the information within the circled region may be extracted.” See column 5, lines 45-50 of *Bloomberg*.

Claim 14 is allowable at least because *Bloomberg* does not disclose the claimed recognition of a specific pattern based on a condition of the pixels together with the other claimed features. That is, the highlighted regions in *Bloomberg* are not specific patterns at least because they are arbitrarily drawn by a user with a highlighter. In other words, the highlighted marks can be at any location, can be any shape, and can be any size. Were that not the case, detection would be much

easier (as in *Yamaguchi*) and the problems addressed in *Bloomberg* would be moot. Also, the circles referred to in *Bloomberg* in column 5, lines 45-50, are hand drawn and are therefore not specific patterns for the same reasons the highlighter marks are not specific patterns. Also, any mark could be inside the circle and would not be specific patterns either.

Further, as the technology described in *Bloomberg* relates to drawn highlighter marks and circles, both of which are arbitrarily created by the hand of a user, there would have been no motivation to apply that technology to detection of specific patterns. For at least that reason, even though both documents relate to image detection, there would still have been no motivation to combine the two references as suggested in the Official Action, one being much different than the other.

Claim 14 is also allowable at least because it defines that the partial image is recognized based on at least one of three conditions: 1) the conditions concerning the pixels at opposite vertices of a pixel-block having a predetermined size, 2) the conditions concerning the pixels on the outermost lines of the pixel-block area, and 3) the conditions concerning the pixels on the opposite sides on the outermost lines of the pixel-block area. *Bloomberg* does not disclose any of the conditions.

With regard to the first condition, i.e., the conditions concerning pixels at opposite vertices, the Official Action points to column 12, lines 35-56, in *Bloomberg*. There, a hybrid process for establishing the highlighted area is discussed. Part "e" entails filling the highlighted regions into solid bounding boxes, and part "f" refers to the identification of the vertices of the bounding boxes. Basically, a box is established around the highlighted area and the vertices of that box are identified.

However, that subject matter does not lend itself to a disclosure of recognition of a partial image of a specific pattern based on pixels at opposite vertices of a pixel block of a predetermined size. For example, there is no disclosure that the selection of the vertices in *Bloomberg* relates to selection of a specific pattern (the highlighted area is not a specific pattern), or that the highlighter area is a pixel block, as referred to in the claims. Further, even if one were to consider the boxed in highlighter area, *arguendo*, as being a pixel block, it is still not a predetermined size, as defined in the claims, because the highlighted region is randomly sized and so is the box surrounding it.

With regard to the second condition, the conditions concerning pixels on the outermost lines of the pixel-block area, the Official Action points to the disclosure in column 8, lines 39-57 in *Bloomberg*, that portion relating to production of an HR (highlighted region) and corresponding erosion/dilation of the image. That is, to produce a HR the image of the highlighted region is eroded/dilated, among other treatments. Specifically, "the image is eroded in step 28 with a 1 x 4 SE. Thereafter, in step 30 an ERODE is conducted using a 4 x 1 SE. In step 32 and 34, respectively, a DILATE with a 1 x 4 SE and DILATE with a 4 x 1 SE are conducted. The 4 x 4, 1 x 4, and 4 x 1 SEs are illustrated in Fig. 3." As pointed to in the Official Action, column 8, lines 45-49 describes that "[t]he net effect of sequential ERODE by a horizontal and then a vertical SE is the same as if the image were ERODED by the outer product of the horizontal and vertical elements", that portion being relied upon for a disclosure of the subject matter relating to outermost lines of a pixel-block area. However, it is clear that the portion of *Bloomberg* relied upon for a disclosure of conditions upon which a partial image of a specific pattern is recognized, is instead

related to erosion/dilation of the image, i.e. "cleaning up" the image. Further, the portion of the image being operated on is the HR (highlighter region), which has already been established as not being a specific pattern as defined in the claims.

With regard to the third condition, relating to the conditions concerning pixels on opposite sides on the outermost lines of the pixel-block area, the Official Action points to column 12, lines 35-36 in *Bloomberg*. However, as noted earlier with regard to the first condition, *Bloomberg* does not disclose recognition of a partial image of a specific pattern based on pixels on the outermost lines of a pixel-block area. Therefore, *Bloomberg* cannot disclose recognition based on conditions of pixels on opposite sides of the outermost lines of the pixel-block area. Also, the portion of *Bloomberg* identified in the Official Action only recites "OPEN the image using a 3 x 3 SE to remove most of the ON pixels that are outside the highlighted regions." That recitation has nothing to do with pixels on the outermost lines of a pixel-block area, and rather relates to pixels outside the highlighted region. Should this rejection be maintained, it is requested that it be specifically explained how that portion of *Bloomberg* relates to pixels on an outermost line of a pixel-block area.

For at least the reasons stated above, Claim 14 is allowable.

Claims 20 and 21 are allowable for similar reasons as those discussed in connection with Claim 14.

Claims 15, 19 and 22-27 are allowable at least by virtue of their dependence upon allowable independent Claims 14, 20 and 21.

Claims 16-18 are rejected as being unpatentable over *Yamaguchi* in view of *Bloomberg*, and further in view of the Background section of the present application. Claims 16-18 define subject matter generally relating to a total number of OFF/ON

pixels on the outermost lines or vertices of the pixel-block area. The Official Action proposed that that subject matter is discussed in the Background of the invention section of the present application, however, the Background section of the present application refers to ON/OFF pixels within a predetermined area, not on the outer line of a pixel-block area. For at least that reason, Claims 16-18 are allowable. Also, it would not have been obvious to modify the combination of *Yamaguchi* and *Bloomberg* to arrive at the claimed subject matter at least because, as noted earlier, the portions relied upon in *Bloomberg* to be included in *Yamaguchi* are related to "cleaning up" highlighter regions and are not related to counting ON/OFF pixels. For at least that reason, the proposed modification would not have been obvious, and Claims 16-18 are allowable.

New Claims 25-27 generally define that the recognition of the partial image is based on at least two of the conditions concerning the pixels. That subject matter is not disclosed or suggested in the cited documents and Claims 25-27 are therefore allowable.

For at least the reasons stated above, it is requested that all the objections and rejections be withdrawn and that this application be allowed.

Should any questions arise in connection with this application, or should the examiner feel that a teleconference would be helpful in resolving any remaining issues pertaining to this application, the undersigned respectfully requests that he be contacted at the number indicated below.

Respectfully submitted,

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